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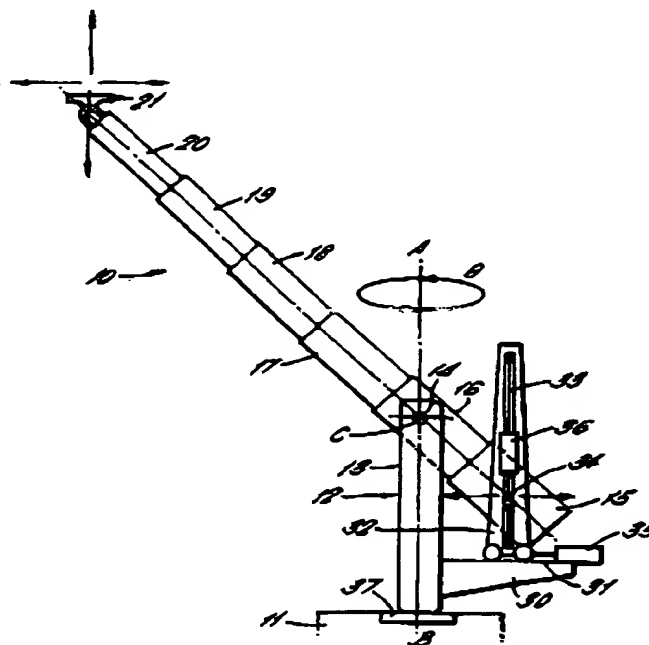
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| (51) International Patent Classification 6 :<br><b>B66F 11/04</b>   | <b>A1</b> | (11) International Publication Number: <b>WO 99/33744</b><br>(43) International Publication Date: <b>8 July 1999 (08.07.99)</b>  |
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(54) Title: **CAMERA MOUNTINGS FOR TV/VIDEO CAMERAS**

(57) Abstract

A camera mounting for a TV/video camera, comprising a base (11) having a datum point, and a counter/balanced arm assembly (10) mounted on the base at one end (15) thereof and having a platform (21) for carrying a camera at the other end thereof for supporting the camera platform for movement in three orthogonal axes with respect to the datum. Transducer means (35, 36, 37) are provided for determining movement of the camera platform with respect to the datum point in said three axes to provide information regarding the location of the camera for purposes such as controlling movement of a virtual reality image to be combined with a real image as seen by the camera as the camera is moved with respect to the datum.



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CAMERA MOUNTINGS FOR TV/VIDEO CAMERAS

5 This invention relates to camera mountings for TV/video cameras and is particularly although not exclusively applicable to the camera mountings of our European Patent Publication No. 0725758 and our UK Patent Publication No. 2163720.

10 This invention provides a camera mounting for a TV/video camera, comprising a base having a datum point, a counter-balanced arm assembly mounted on the base at one end thereof and having a platform for carrying a camera at the other end thereof for  
15 supporting the camera for movement in three orthogonal axes with respect to the datum and transducer means for determining movement of the camera platform with respect to the datum point in said three axes to provide information regarding the location of the  
20 camera for purposes such as controlling movement of a virtual reality image to be combined with a real image as seen by the camera as the camera is moved with respect to the datum.

25 More specifically, the arm assembly is mounted on the base for rotation about a vertical axis through the datum point, the arm assembly providing movement of the camera platform in two orthogonal axes in any plane containing said vertical axis, and said  
30 transducer means comprising first means for determining rotation of the arm about said vertical axis and further means for determining movement of the camera mounting in said plane with respect to the datum point.

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In one arrangement according to the invention,

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the arm assembly may be telescopic and may be mounted on the base to pivot in a vertical plane about a horizontal axis.

5        In an alternative construction according to the invention, the arm assembly may comprise a first arm pivotally mounted on the base about a horizontal axis and a second arm pivotally mounted on the first arm about a parallel horizontal axis for supporting the  
10 camera platform.

      In any of the above arrangements, the arm assembly may have a control point connected to the arm assembly so that movement of the control point with  
15 respect to the datum point in the vertical plane containing the arm and said vertical axis is directly proportional to the movement of the camera platform and said further transducer means is arranged to monitor movement of the control point with respect to  
20 the datum point.

      More specifically, the transducer means for monitoring movement of the control point may comprise separate transducers for responding to movement of the  
25 control point with respect to the datum point in vertical and horizontal directions.

      In the case where the arm assembly is telescopically extendable and pivotable about a  
30 horizontal axis, the transducer means may be arranged to monitor extension of the arm and pivotal movement of the arm about said horizontal axis to monitor the position of the camera platform in a vertical plane with respect to said datum.

35        In the case where the arm assembly has first and second pivoted arms, said further transducer means may

be arranged to monitor pivotal movement of the first arm about said horizontal axis with respect to the base and pivotal movement of the second arm with respect to the first arm to monitor the position of the camera platform with respect to said datum.

The following is a description of some specific embodiments of the invention, reference being made to the accompanying drawings in which:

Figure 1 is a diagrammatic view of a camera mounting for a TV/video camera embodying a telescopic arm mounting and one arrangement of transducers for determining movement of the camera platform;

Figure 2 is a view of a similar camera mounting embodying a telescopic arm mounting with an alternative arrangement of transducers for determining movement of the camera platform;

Figure 3 is a diagrammatic view of a camera mounting having a pantograph arm assembly and arrangement of transducers for determining movement of the camera platform; and

Figure 4 is a similar view to Figure 3 showing a further arrangement of transducers for determining the movement of the camera platform.

Referring firstly to Figure 1 of the drawings, there is shown a camera mounting for a television or video camera. A detailed description of the arm is set out in our European Patent Publication No. 0725758 to which reference should be made. Briefly the mounting comprises a counter-balanced telescopic arm indicated generally at 10, mounted on a base indicated generally at 11. An upwardly extending bifurcated column 12 is mounted for rotation on the base about a vertically extending axis A-B. The bifurcated column has spaced arms 13 having inwardly extending trunnions 14

at their upper ends to receive and support the arm 10 for tilting about a horizontal axis indicated at C.

5       The telescopic arm comprises six elements or stages 15 to 20 which are slidably engaged one within the other to move between the extended position shown in Figure 1 and a retracted position which is not shown. A mechanism interlinks the successive stages of the arm so that when the arm is extended all the  
10       stages extend by the same amounts with respect to each other and when contracted, contract by the same amounts with respect to each other. The arm is pivotally mounted on the trunnion 14 on the intermediate element 16 next to end element 15 for  
15       rotation of the arm about the horizontal axis C defined by the trunnions.

20       The outer end stage 20 of the arm carries a platform 21 to receive and support a TV or video camera in a mounting which provides usual pan and tilt movements. The other end stage 15 of the arm contains a fixed weight (not shown) intended to balance the arm whether in extended or "telescoped" mode. The  
25       mounting thus permits manual (or "motorised") movement of the platform (and thereby the camera) in three axes with respect to an origin or datum point on the base and also normal pan and tilt movement of the camera on the platform 21.

30       The column 12 has a horizontally extending platform 30 located to one side of the column and disposed below the inner end stage 15 of the arm. A guideway 31 is mounted on the platform and a wheeled carriage 32 is constrained to run on the guideway to  
35       support the carriage for horizontal movement along the guideway. The carriage is formed with a vertically

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extending slot 33 in which a pin 34 on the inner end  
stage 15 of the arm is constrained to slide so that as  
the arm tilts about the horizontal axis C, the pin  
will slide up and down the slot and at the same time  
5 the carriage 32 will move along the guideway. Rams  
may be provided for moving the carriage along the  
guideway and for moving the pin vertically up and down  
the slot to provide "motorised" movement of the camera  
in the two axes of movement, that is parallel to axis  
10 A-B and towards and away from axis A-B.

To determine the movement and thereby the  
position of the camera platform with respect to the  
origin or datum of the axis A-B at the base of the  
15 camera mounting, one linear transducer 35 is mounted  
on the platform 30 and is coupled to the carriage 32  
to determine horizontal movement of the carriage, a  
second linear transducer 36 is mounted vertically on  
the carriage to determine movement of the pin and a  
20 third transducer 37 is mounted on the base to  
determine rotation of the pedestal about the vertical  
axis A-B with respect to the base.

The pin on the arm provides a control point,  
25 movement of which in the horizontal and vertical  
directions will be proportional to the corresponding  
movements of the camera platform in horizontal and  
vertical directions. The constant of proportionality  
will be the number of moving stages "N" of the arm  
30 between the axis C and the platform 30.

Let  $m$  = the horizontal co-ordinate of the control  
point in the plane of the arm;

$n$  = the vertical co-ordinate of the control point  
35 in the plane of the arm; and

$\theta$  = the angle of rotation of the arm about the vertical axis A-B.

Then the co-ordinates of the camera platform position relative to an origin on the vertical axis A-B will be as follows :

$N.m.\cos.\theta$ ;  $N.m.\sin \theta$ ;  $N.n$ .

The information relating to the camera platform position may be fed to monitoring equipment which merges a virtual reality background with a foreground as seen by the camera. Transducers are also provided on the camera pan and tilt mechanisms for determining pan and tilt movement of the camera. The virtual reality background image is moved in accordance with movement of the camera mounting and the camera pan and tilt mechanisms as the camera is moved in viewing the foreground so that the virtual reality background moves appropriately with the foreground.

Figure 2 shows an alternative arrangement in which one rotary transducer 38 measures the angle  $\alpha$  of the arm 10 to the horizontal and a second, linear transducer 39 measures the extension of one section of the arm with respect to another. This extension is proportional to the extension of the entire telescopic arm, the constant of proportionality being the number of stages of the arm between the axis C and the platform 30. The extension together with the angle  $\alpha$  provides a set of co-ordinates for the camera position in a plane containing the arm and axis A-B. A third rotary transducer is placed on the axis A-B for measuring  $\theta$ , the angle of orientation of the arm about the vertical axis.



The co-ordinates of the camera platform position are then defined as follows :

$$\begin{aligned} & (Nx+y) \cos \alpha \cos \theta; \\ 5 \quad & (Nx+y) \cos \alpha \sin \theta; \\ & (Nx+y) \sin \alpha. \end{aligned}$$

Figures 3 and 4 show an application of the invention to the balanced camera mounting embodying a pantographic arm as described and illustrated in our UK Patent Publication No. 2163720. The camera mounting comprises a base 50 mounted for rotation about a vertical axis indicated at A-B. A counter-balanced pantographic mechanism 51 is mounted on the base comprising an upwardly extending first parallelogram linkage 52 pivotally mounted about horizontal axes on the base and a second parallelogram linkage 53 connected by a common link 54 to the upper end of the first linkage at one end and having a camera support platform 55 at its other end. A counter-balancing mechanism indicated at 56 is connected to the parallelogram linkages and has a control point P constrained to move horizontally and vertically in proportion to the movement of the platform 55. Transducers determine the horizontal and vertical extent of movement of the control point P in a similar manner to the arrangement of Figure 1.

Movement of the control point P in the horizontal and vertical directions is proportional to the movement in the directions in the plane of the arm of the camera platform. The constant of proportionality "k" is related to the length of the sections of the linkages of the arm.

35

Two linear transducers measure the horizontal and

vertical or cartesian co-ordinates "m" and "n" of the point P relative to an origin on vertical axis A-B. A third rotary transducer is placed on axis A-B to measure  $\theta$ , the angle of orientation of the arm about the vertical axis. The co-ordinates of the camera position are then as follows :

5  
 10  

$$\begin{aligned} &K.m.\cos \theta; \\ &K.m.\sin \theta; \\ &K.n. \end{aligned}$$

Figure 4 shows a further arrangement to Figure 3 with an alternative arrangement of the transducers for determining the movement of the arm. Two rotary transducers are placed at the hinge points of the arm (as shown). Transducer 61 monitors the angle  $\beta$  which arm section 52 makes with the vertical. Transducer 62 monitors the angle  $\alpha$  which arm section 52 makes with arm section 53. A third rotary transducer 63 is placed on the axis A-B to measure  $\theta$ , the angle of orientation of the arm from a datum on the base.

The three angles  $\alpha, \beta$  and  $\theta$  can be used to find the co-ordinates of the position of the camera platform which are as follows :

30  

$$\begin{aligned} &[(L_1 \sin \beta + L_2 \sin(\beta + \alpha)) \cdot \cos \theta; \\ &[(L_1 \sin \beta + L_2 \sin(\beta + \alpha)) \cdot \sin \theta; \\ &L_1 \cos \beta + L_2 \cos(\beta + \alpha) \end{aligned}$$

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CLAIMS

1. A camera mounting for a TV/video camera,  
comprising a base having a datum point, a counter-  
5 balanced arm assembly mounted on the base at one end  
thereof and having a platform for carrying a camera at  
the other end thereof for supporting the camera  
platform for movement in three orthogonal axes with  
respect to the datum and transducer means for  
10 determining movement of the camera platform with  
respect to the datum point in said three axes to  
provide information regarding the location of the  
camera for purposes such as controlling movement of a  
virtual reality image to be combined with a real image  
15 as seen by the camera as the camera is moved with  
respect to the datum.

2. A camera mounting as claimed in claim 1,  
wherein the arm assembly is mounted on the base for  
20 rotation about a vertical axis through the datum  
point, the arm assembly providing movement of the  
camera platform in two orthogonal axes in any plane  
containing said vertical axis, and said transducer  
means comprising first means for determining rotation  
25 of the arm about said vertical axis and further means  
for determining movement of the camera platform in  
said plane with respect to the datum point.

3. A camera mounting as claimed in claim 2,  
30 wherein, the arm assembly is telescopic and is mounted  
on the base to pivot in a vertical plane about a  
horizontal axis.

4. A camera mounting as claimed in claim 2,  
35 wherein the arm assembly comprises a first arm  
pivotally mounted on the base about a horizontal axis

and a second arm pivotally mounted on the first arm about a parallel horizontal axis for supporting the camera platform.

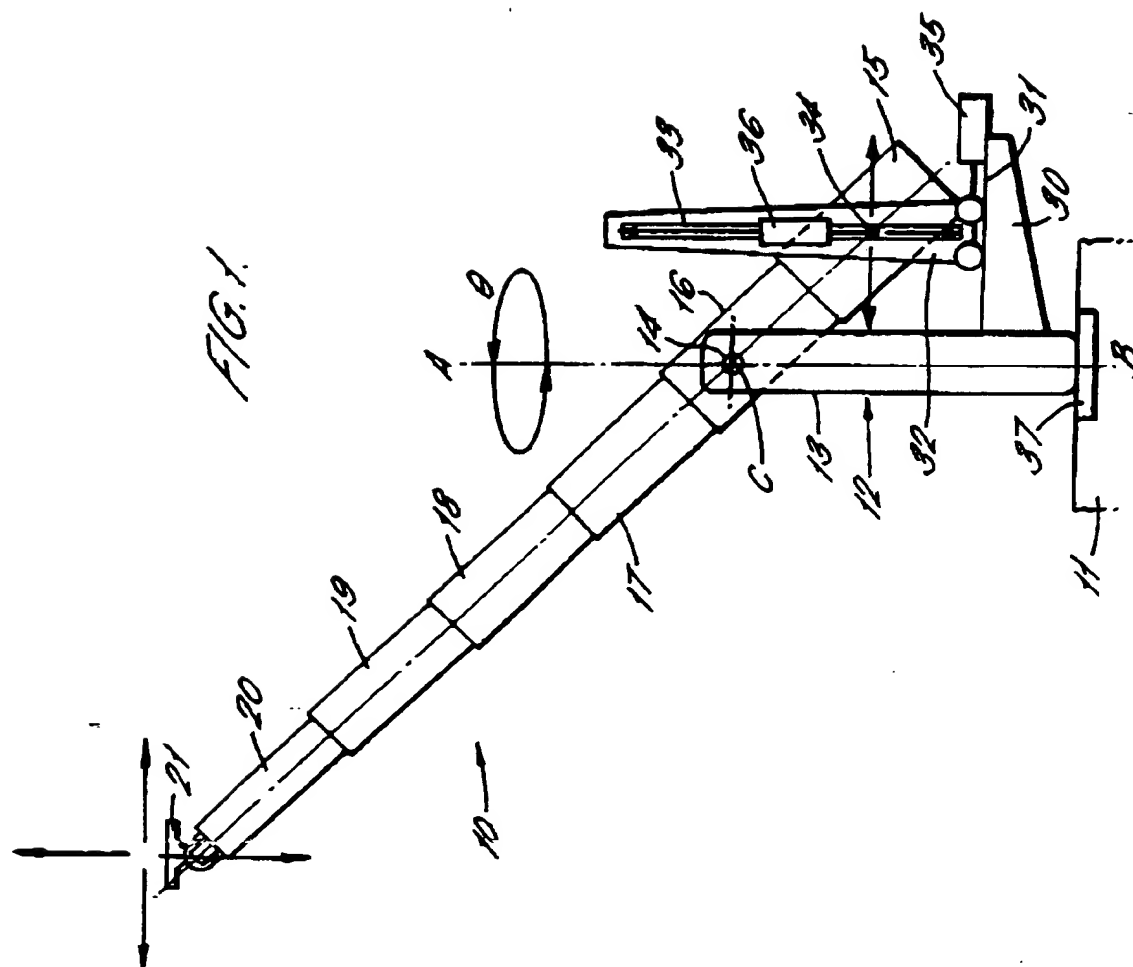
5           5. A camera mounting as claimed in any of  
claims 2 to 4, wherein the arm assembly has a control  
point connected to the arm assembly so that movement  
of the control point with respect to the datum point  
10           in the vertical plane containing the arm and said  
vertical axis is directly proportional to the movement  
of the camera platform, and said further transducer  
means is arranged to monitor movement of the control  
point with respect to the datum point.

15           6. A camera mounting as claimed in claim 5,  
wherein the transducer means for monitoring movement  
of the control point comprise separate transducers for  
responding to movement of the control point with  
respect to the datum point in vertical and horizontal  
20           directions.

            7. A camera mounting as claimed in claim 3,  
wherein the further transducer means are arranged to  
monitor extension of the arm and pivotal movement of  
25           the arm about said horizontal axis to monitor the  
position of the camera platform in a vertical plane  
with respect to said datum.

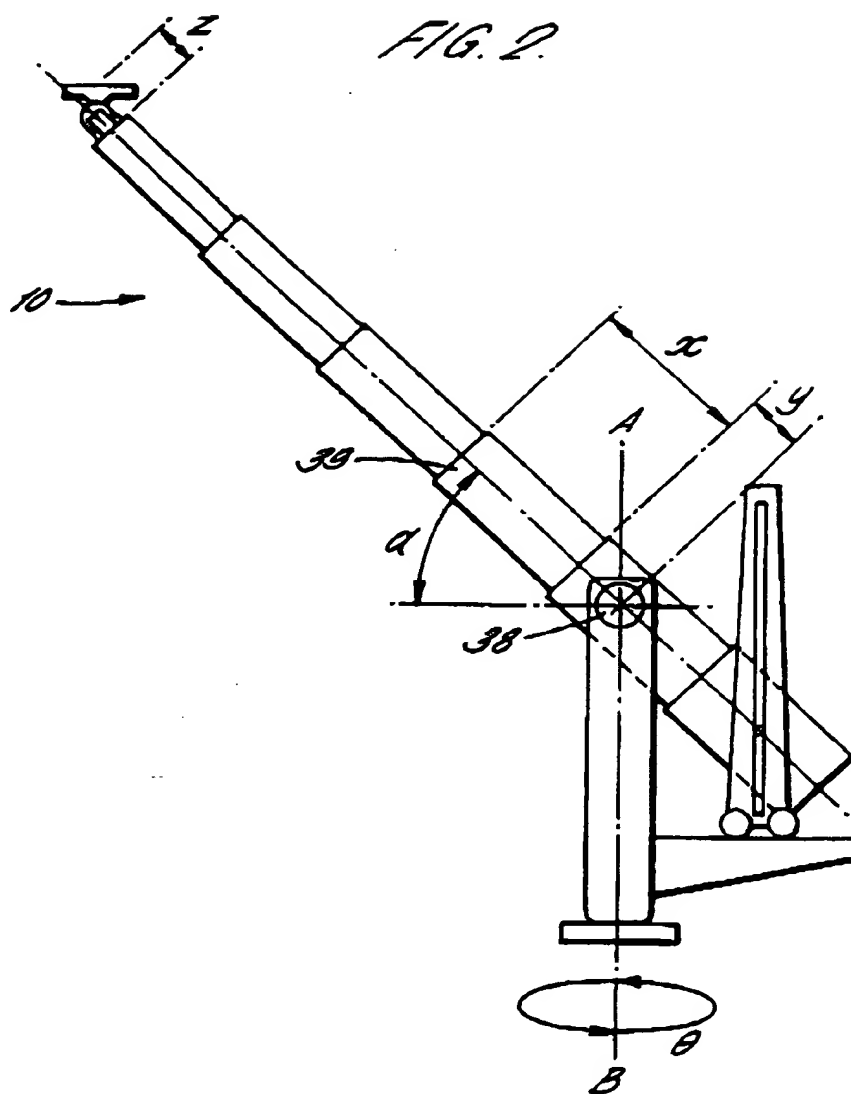
            8. A camera mounting as claimed in claim 4,  
30           wherein said further transducer means are arranged to  
monitor pivotal movement of the first arm about said  
horizontal axis with respect to the base and pivotal  
movement of the second arm with respect to the first  
arm to monitor the position of the camera platform  
35           with respect to said datum.

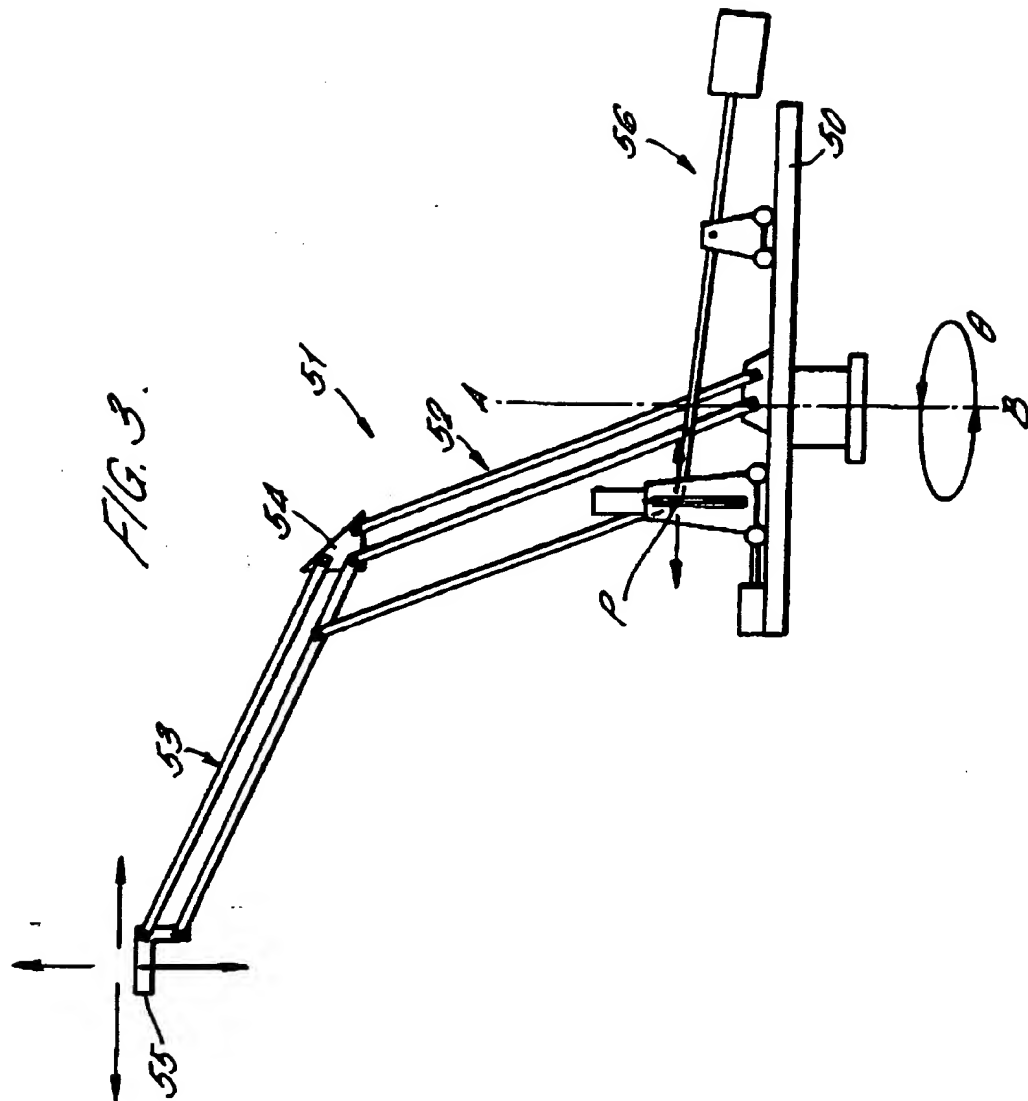
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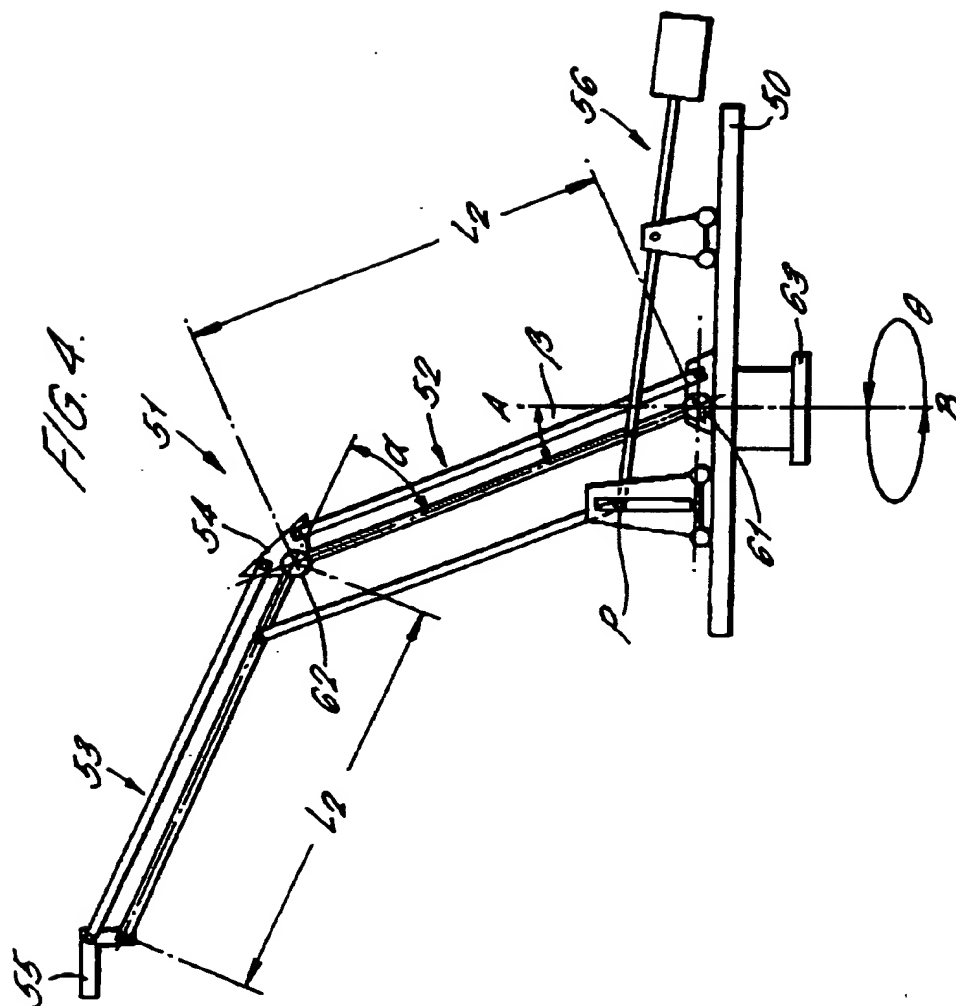
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FIG. 2.





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## INTERNATIONAL SEARCH REPORT

09/582278

Internat. Application No.

PCT/GB 98/03520

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 B66F11/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B66F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|----------|--|-----------------------|
| X        | DE 94 08 384 U (MAGICMOVE GESELLSCHAFT FÜR VISUELLE EFFEKTE) 4 August 1994         | 1,2                   |
| Y        | see page 1, paragraph 1 - page 2, paragraph 3                                      | 3                     |
| Y        | see page 7, paragraph 1 - page 17, paragraph 4                                     |                       |
| Y        | WO 94 12424 A (VINTEN GROUP PLC) 9 June 1994                                       | 3                     |
| A        | see abstract; figure 1   | 5                     |
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| X        | FR 2 264 298 A (MAGICAM) 10 October 1975   | 1                     |
| Y        | see the whole document   | 4                     |
|          | ---<br>-/--<br>---   |                       |

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

19 February 1999

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26/02/1999

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Authorized officer

Van den Berghe, E

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No. |
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## INTERNATIONAL SEARCH REPORT

Information on patent family members

Internat. Application No

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| Patent document<br>cited in search report |   | Publication<br>date | Patent family<br>member(s)  | Publication<br>date  |
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| FR 2554800                                | A | 17-05-1985          | NONE  |  |



## PATENT COOPERATION TREATY

PCT

09/582278

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

|  |  |  |  |
|--|--|--|--|
| Applicant's or agent's file reference<br>48663001/IA9248   |  | <b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)                                    |  |
| International application No.<br>PCT/GB98/03520  | International filing date (day/month/year)<br>25/11/1998 | Priority date (day/month/year)<br>23/12/1997   |  |
| International Patent Classification (IPC) or national classification and IPC<br>B66F11/04  |  |  |  |
| Applicant<br>VITEC GROUP, PLC et al.   |  |  |  |
| <p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 5 sheets.</p>   |  |  |  |
| <p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li>I <input checked="" type="checkbox"/> Basis of the report</li> <li>II <input type="checkbox"/> Priority</li> <li>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li>IV <input type="checkbox"/> Lack of unity of invention</li> <li>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li>VI <input type="checkbox"/> Certain documents cited</li> <li>VII <input type="checkbox"/> Certain defects in the international application</li> <li>VIII <input type="checkbox"/> Certain observations on the international application</li> </ul> |  |  |  |
| Date of submission of the demand<br><br>23/06/1999   |  | Date of completion of this report<br><br>29.03.00  |  |
| Name and mailing address of the international preliminary examining authority:<br> European Patent Office<br>D-80298 Munich<br>Tel. +49 89 2399 - 0 Tx: 523656 epmu d<br>Fax: +49 89 2399 - 4485  |  | Authorized officer<br><br>Koob, M<br><br>Telephone No. +49 89 2399 2080<br> |  |

Form PCT/IPEA/409 (cover sheet) (January 1994)

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**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB98/03520

**I. Basis of the report**

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

**Description, pages:**

|      |                     |                           |            |
|------|---------------------|---------------------------|------------|
| 2-8  | as originally filed |                           |            |
| 1,1a | as received on      | 26/01/2000 with letter of | 24/01/2000 |

**Claims, No.:**

|     |                |                           |            |
|-----|----------------|---------------------------|------------|
| 1-8 | as received on | 26/01/2000 with letter of | 24/01/2000 |
|-----|----------------|---------------------------|------------|

**Drawings, sheets:**

|         |                     |
|---------|---------------------|
| 1/4-4/4 | as originally filed |
|---------|---------------------|

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

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**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

|                               |      |            |
|-------------------------------|------|------------|
| Novelty (N)                   | Yes: | Claims 1-8 |
|                               | No:  | Claims     |
| Inventive step (IS)           | Yes: | Claims     |
|                               | No:  | Claims 1-8 |
| Industrial applicability (IA) | Yes: | Claims 1-8 |
|                               | No:  | Claims     |

**2. Citations and explanations****see separate sheet**

**INTERNATIONAL PRELIMINARY** Inten  
**EXAMINATION REPORT - SEPARATE SHEET**

**International application No. PCT/GB98/03520**

Reference is made to the following documents:

**D1: WO 94 12424**

**D2: FR-A-2 264 298**

**D3: GB-A-2 163 720**

### **V. Reasoned statement**

- 1.** The subject-matter of **claim 1** does not involve an inventive step (Article 33(3) PCT).
- 1.1** **D1** discloses a camera mounting comprising:
- a basis (11)
  - an arm assembly (10)
    - counter-balanced (23)
    - swivel about a vertical axis (29)
    - a platform (32)
    - relatively movable components (24-28)
    - movement of the platform in three orthogonal axes (20, 29, 24-28)
- 1.2** **Claim 1** differs from **D1** by:
- a) the basis having a datum point
  - b) three separate transducer means for determining movement of the arm components
  - c) monitoring means for determining position of the platform
- 1.3** The problem to be solved by the present invention may therefore be regarded as to provide information regarding the location of the camera for purposes such as controlling movement of a virtual reality image to be combined with a real image as seen by the camera as the camera is moved with respect to the datum.
- 1.4** **D2** discloses a camera mounting for movement of the camera in three orthogonal axes by the steered wheels (fig. 15, elem. 375, 381, 382, 383) of a carriage, a pivot arm (fig. 14, elem. 45) about a horizontal axis and a camera-platform (fig.

**INTERNATIONAL PRELIMINARY  
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14+18, elem. 48) which pivots about a vertical and a horizontal axis. Each movement is surveyed by a separate sensor (feature b of paragraph 1.2; fig. 17, elem. 396, fig. 16, elem. 388, fig. 14, elem. 393, fig. 21, elem. 435, fig. 18, elem. 420) to determine with the aid of a computer (feature c of paragraph 1.2; fig. 1, elem. 56) the position of the camera (p. 19, l. 32 - p. 21, l. 9) with respect to a reference point (feature a of paragraph 1.2; p. 4, l. 21). This movement is reproduced by the mounting of a background camera and corresponds to the problem outlined in paragraph 1.3.

**1.5 Concerning features a, b and c of paragraph 1.2:**

- a)** The simplest transformation of coordinates to calculate the position of the camera is achieved by choosing the reference at a stationary point preferably including one or more axes of the movement. Herewith the choice of the datum point lying on the basis is obvious.
- b)** D2 is teaching to provide at each axis of movement a separate sensor. As the movement is realised in D1 by a swivel movement about a vertical axis and relative movement between arm components, it is obvious to place the sensors there.
- c)** The computer of D2 corresponds to the monitoring means and is determining the position of the camera.

To solve the problem mentioned in paragraph 1.3 it is therefore obvious to combine D1 and D2.

**2. The subject-matter of the dependent claims 2 to 8 does not involve an inventive step (Article 33(3) PCT):**

**Claim 2** see paragraph 1.5 a

**Claim 3** see D1

**Claim 4** see D3

**Claims 5 and 6** see D1, p. 12, l. 30 - p. 13, l. 5

**Claims 7 and 8** see paragraph 1.5 b



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CAMERA MOUNTINGS FOR TV/VIDEO CAMERAS

This invention relates to camera mountings for TV/video cameras and is particularly although not  
5 exclusively applicable to the camera mountings of our European Patent Publication No. 0725758 and our UK Patent Publication No. 2163720.

WO/A-94/12424 discloses a counterbalanced load  
10 carrier comprising a multi-stage telescopic arm. One stage adjacent one end of the arm is mounted for rotation by a vertical axis on a mobile base. The adjacent end stage of the arm carries a counterweight and the end stage at the other end of the arm carries  
15 a support for a TV or video camera. The respective stages of the arm are interconnected by a cable or like mechanism to extend and retract together maintaining a fixed ratio between the radius of the payload support and the horizontal axis and the  
20 counterweight and the horizontal axis so that the arm remains counterbalanced throughout its range of extension and retraction. The cable mechanism also acts on the camera support on said end section of the arm to maintain the support horizontal throughout the  
25 range of tilting of the arm. An additional counterbalancing force can be applied at control point on end stage, the control point being constrained to move in a vertical guideway located on a horizontal moveable carriage to follow the vertical/horizontal  
30 movement of the end stage of the arm.

FR-A-2264298 discloses a camera mounting for movement of a camera in third orthogonal axes by  
steered wheels of a carriage, a pivot arm about a  
35 horizontal axis and a camera platform which pivots about a vertical and a horizontal axis. Each movement is monitored by a separate sensor to determine, with

AMENDED SHEET

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the aid of a computer, the position of the camera with respect to a reference point.

5 This invention provides a camera mounting for a  
TV-video camera, comprising a base, a counter-balanced  
arm assembly pivotally mounted on the base at one end  
thereof to swivel about a vertical axis and having a  
platform for carrying a camera at the other end  
10 thereof, the arm assembly having relatively movable  
components to permit, with said swivelling of the  
assembly about said vertical axis, movement of the  
platform in three orthogonal axes; wherein the base of  
the mounting has a datum point, the mounting has three  
15 separate transducer means for determining swivel  
movement of the arm about said vertical axis and  
relative movement between said arm components in a  
plane containing said vertical axis, and monitoring  
means are provided for determining, from the movements  
20 detected by said transducers, the position of the  
camera platform with respect to the datum point in  
said three axes to provide information regarding the  
location of the camera for purposes such as  
controlling movement of a virtual reality image to be  
combined with a real image as seen by the camera as  
25 the camera is moved with respect to the datum.

More specifically, the arm assembly is mounted  
on the base for rotation about a vertical axis through  
the datum point, the arm assembly providing movement  
30 of the camera platform in two orthogonal axes in any  
plane containing said vertical axis, and said  
transducer means comprising first means for  
determining rotation of the arm about said vertical  
axis and further means for determining movement of the  
35 camera mounting in said plane with respect to the  
datum point.

In one arrangement according to the invention

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## CLAIMS:

5           1.    A camera mounting for a TV/video camera,  
              comprising a base, a counter-balanced arm assembly  
              (10) pivotally mounted on the base (11) at one end  
              thereof to swivel about a vertical axis (A-B) and  
10            having a platform (21) for carrying a camera at the  
              other end thereof, the arm assembly having relatively  
              movable components (16 to 20; 52 to 54) to permit,  
              with said swivelling of the assembly about said  
              vertical axis, movement of the platform in three  
15            orthogonal axes; characterised in that the base (11)  
              of the mounting has a datum point, the mounting has  
              three separate transducer means for determining swivel  
              movement of the arm about said vertical axis (A-B) and  
              relative movement between said arm components in a  
              plane containing said vertical axis, and monitoring  
20            means are provided for determining, from the movements  
              detected by said transducers, the position of the  
              camera platform with respect to the datum point in  
              said three axes to provide information regarding the  
              location of the camera for purposes such as  
25            controlling movement of a virtual reality image to be  
              combined with a real image as seen by the camera as  
              the camera is moved with respect to the datum.

              2.    A camera mounting as claimed in claim 1,  
30            wherein the arm assembly (10) is mounted on the base  
              (11) for rotation about a vertical axis (A-B) through  
              the datum point, the arm assembly providing movement  
              of the camera platform in two orthogonal axes in any  
              plane containing said vertical axis, and said  
35            transducer means comprising first transducer means for  
              determining rotation of the arm about said vertical  
              axis and further transducer means for determining  
              movement of the camera platform in said plane with

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respect to the datum point.

- 5           3.    A camera mounting as claimed in claim 2,  
              wherein the arm assembly (10) is telescopic and is  
              mounted on the base (10,12) to pivot (14) in a  
              vertical plane about a horizontal axis (C).
- 10           4.    A camera mounting as claimed in claim 2,  
              wherein the arm assembly (10) comprises a first arm  
              (52) pivotally mounted on the base (11) about a  
              horizontal axis and a second arm (53) pivotally  
15           mounted on the first arm about a parallel horizontal  
              axis for supporting the camera platform (55).
5.    A camera mounting as claimed in any of  
              claims 2 to 4, wherein the arm assembly (10) has a  
20           control point (34, P) connected to the arm assembly so  
              that movement of the control point with respect to the  
              datum point in the vertical plane containing the arm  
              and said vertical axis is directly proportional to the  
              movement of the camera platform, and said further  
25           transducer means is arranged to monitor movement of  
              the control point with respect to the datum point.
6.    A camera mounting as claimed in claim 5,  
              wherein the transducer means for monitoring movement  
              of the control point (34, P) comprise separate  
30           transducers for responding to movement of the control  
              point with respect to the datum point in vertical and  
              horizontal directions.
7.    A camera mounting as claimed in claim 3,  
35           wherein the further transducer means are arranged to  
              monitor extension of the arm and pivotal movement of  
              the arm about said horizontal axis to monitor the  
              position of the camera platform in a vertical plane

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with respect to said datum.

5

8. A camera mounting as claimed in claim 4,  
wherein said further transducer means are arranged to  
monitor pivotal movement of the first arm about said  
horizontal axis with respect to the base and pivotal  
10 movement of the second arm with respect to the first  
arm to monitor the position of the camera platform  
with respect to said datum.

15

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: 13724: GCB: CAP: F000000000

PCT COOPERATION TREATY

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PCT

NOTIFICATION OF THE RECORDING  
OF A CHANGE(PCT Rule 92bis.1 and  
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

BOULT WADE TENNANT  
Verulam Gardens  
70 Gray's Inn Road  
London WC1X 8BT  
ROYAUME-UNIRECEIVED  
NOV 13 2000  
TECH CENTER 2700

|  |   |
|--|---|
| Date of mailing (day/month/year)<br>23 May 2000 (23.05.00) | IMPORTANT NOTIFICATION  |
| Applicant's or agent's file reference<br>48663001/IA9248   |   |
| International application No.<br>PCT/GB98/03520            | International filing date (day/month/year)<br>25 November 1998 (25.11.98) |

## 1. The following indications appeared on record concerning:

☐ the applicant      ☐ the inventor      ☒ the agent      ☐ the common representative

## Name and Address

BOULT WADE TENNANT  
27 Furnival Street  
London EC4A 1PQ  
United Kingdom

## State of Nationality

## State of Residence

## Telephone No.

0171 430 7500

## Facsimile No.

0171 405 1916

## Teleprinter No.

## 2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person      ☐ the name      ☒ the address      ☐ the nationality      ☐ the residence

## Name and Address

BOULT WADE TENNANT  
Verulam Gardens  
70 Gray's Inn Road  
London WC1X 8BT  
United Kingdom

## State of Nationality

## State of Residence

## Telephone No.

44 20 7430 7500

## Facsimile No.

44 20 7831 1768

## Teleprinter No.

## 3. Further observations, if necessary:

## 4. A copy of this notification has been sent to:

☒ the receiving Office      ☐ the designated Offices concerned  
☐ the International Searching Authority      ☒ the elected Offices concerned  
☒ the International Preliminary Examining Authority      ☐ other:
The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

C. Cupello

Telephone No.: (41-22) 338.83.38

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
United States Patent and Trademark  
Office  
Box PCT  
Washington, D.C.20231  
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year)

11 August 1999 (11.08.99)

International application No.

PCT/GB98/03520

Applicant's or agent's file reference

48663001/IA9248

International filing date (day/month/year)

25 November 1998 (25.11.98)

Priority date (day/month/year)

23 December 1997 (23.12.97)

Applicant

LINDSAY, Richard, Arthur

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

23 June 1999 (23.06.99)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).